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U.S. DEPARTMENT OF AGRICULTURE

FARMERS' BULLETIN

600

Contribution from the Bureau of Plant Industry, Wm. A. Taylor, Chief.

July 11, 1914.

AN OUTFIT FOR BORING TAPROOTED STUMPS FOR BLASTING.

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INTRODUCTION.

In using explosives to blast stumps from the ground in order to prepare it for farming, it is comparatively easy to place the charge under a stump having a semitaproot or a lateral system of rooting by boring or digging a hole in the earth to a point under the center of resistance and deep enough to give the desired effect.¹

PLACING THE CHARGE.

When clearing land where most of the stumps are taprooted, as in the longleaf-pine regions of the South, it has been found impracticable to place the charge in the earth outside of the stump, as this practice, because of the small size of the lateral roots, usually results in blowing the dirt away from one side and only cracking and slightly loosening the stump.

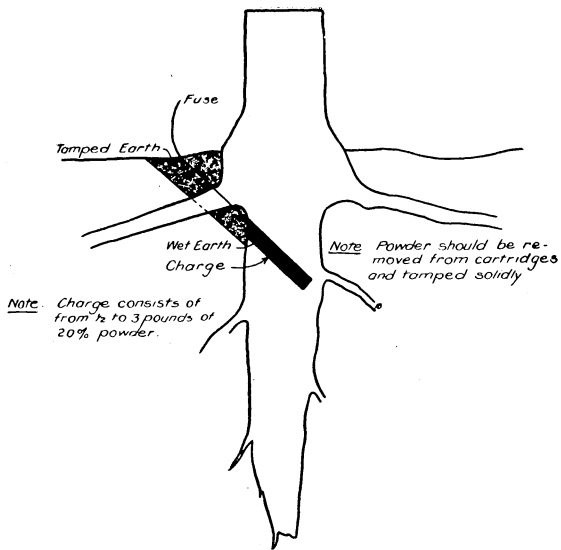


FIG. 1.—Diagram showing a section of a taprooted stump and a charge in position for blasting.

¹ For methods of using powder in blasting stumps, see page 14 of "Cost and methods of clearing land in western Washington," by Harry Thompson, U. S. Department of Agriculture, Bureau of Plant Industry Bulletin 239, 60 p., 25 fig., 1912.

NOTE:—This paper gives detailed information concerning a power outfit for boring taprooted stumps for blasting. In those sections of the country where such stumps are abundant it will be of value in reducing the cost of clearing land for agricultural purposes.

To get the best results when blasting these stumps, the charge must be placed within the taproot. To do this, a hole of sufficient size and deep enough to place the explosive at the center must be bored into the stump. The hole should be bored so deep that the center of the charge will be at or near the center of the taproot. (Fig. 1.)

The hole should be started into the stump from 6 to 10 inches below the surface and should slant downward at an angle of about 45°. When stumps are blasted in this manner most of them will be broken off below the plow line. (Fig. 2.)



FIG. 2.—Result of blasting a longleaf-pine stump by placing a charge within the stump.

Boring these holes by hand with a 1½-inch or 1½-inch auger is heavy work and in some cases will require two men when a ship auger is used.

POWER OUTFIT FOR BORING STUMPS.

Several turpentine companies who are using the stumps of the longleaf pine for distillation purposes have assembled outfits for boring these holes by means of electric drills, with power supplied by a dynamo run by a gasoline engine and mounted upon a wagon.

The outfit.—The outfit consists of the following: One 5-horsepower horizontal gasoline engine, one 3-kilowatt dynamo, all mounted on skids or a wagon and drawn by a team (fig. 3); two electric drills using 1½-inch augers of the required length (fig. 4), together with the necessary cables for connecting. Augers 30 inches in length are commonly used, although it is often desirable to drill to a greater depth. For this purpose a supply of augers 4 feet in length is kept on hand. The longer augers break more frequently than the shorter ones.

The crew.—It requires a crew of six to run this boring machine, as follows: An engineer and driver, four drill men (two for each drill), and a cable man or boy.

METHOD OF OPERATING.

After the engine and dynamo have been securely mounted upon skids or a wagon, as shown in figure 3, the outfit is taken to the stump field, the engine is started by the engineer, and the drills are supplied with current from the dynamo. Each drill is operated by two men and can be used on opposite sides of the outfit for a distance of about 100 feet. The cable boy keeps the cables from



FIG. 3.—Outfit for boring taprooted stumps for blasting.

fouling on the stumps, logs, and underbrush. He also keeps them from kinking, which would cause the copper wires to break.

When the hole is bored to the desired depth (see fig. 4), the drill is removed and a handful of chips put upon the top of the stump to show that it has been bored.

An outfit of this sort drilled 500 stumps a day on an average during the month of May, 1913. The average cost per stump for the holes drilled was slightly less than 3 cents. This cost takes into account repairs, depreciation, and interest, as well as operating expenses.

An outfit of this kind could be utilized for boring the stumps for burning by the method described by Ferris.¹

Although the companies operating these machines do not usually attempt to blow the stumps from far enough below the ground surface for agricultural purposes, it is estimated that digging away the soil

¹ Ferris, E. B. Clearing pine lands. Miss. Agr. Exp. Sta. Bull. 159, 12 p., 4 fig., 1912.

near the stump to permit boring from 6 to 10 inches below the surface will not cost more than 2 cents per stump.

RESULTS OBTAINED IN A TEST.

In a test conducted by one of the companies operating a boring outfit similar to the one described, the dirt was thrown away from one side of the stump to a depth of 12 inches and the hole bored into the stump at least 10 inches below the surface. Of the 100 stumps so blasted, 97 were broken off below plow depth. The roots of the remaining 3 stumps were easily cut out low enough to permit cultivation. Slightly less powder was used upon these stumps than where



FIG. 4.—Boring a longleaf-pine stump with an electric drill. A 30-inch hole has just been completed.

the holes were bored at the surface of the ground. The total average cost for digging, boring, and blasting was 22 cents per stump. This cost does not include the disposal of the stumps, as the tops and roots were used for distillation purposes.

Average cost per stump for digging, boring, and blasting.

Digging hole.....	\$0.020
Boring stump.....	.030
Cap and fuse.....	.025
Powder (using an average charge).....	.145
Total.....	.220

GRADE OF POWDER TO USE.

It has been found by those engaged in blasting the taprooted stumps that the lower grades of nitroglycerin powders are most economical. The higher grades have more of a disruptive effect, tending to shatter the stump, but they do not throw it out of the ground as well as the lower grades of powder. There is very little difference in the effect secured by using 20 per cent and 25 per cent powder. The 20 per cent powder is cheaper and is generally considered the most suitable for stump-blasting purposes.

COST OF THE OUTFIT.

The following prices for an electric stump-boring outfit are f. o. b. distribution point, and freight charges should be added to the place where used.

Necessary equipment for boring stumps, with cost.

5-horsepower gasoline engine.....	\$115
3-kilowatt dynamo.....	185
2 electric drills.....	80
6 augers, assorted lengths.....	25
200 feet of cable.....	20
Skids.....	10
Tools.....	25
Total.....	460

CONCLUSION.

By using one or more electric boring outfits it is possible in a very short time to bore a large number of stumps for burning or blasting. The number of longleaf-pine stumps per acre that had to be bored in the tests varied from 20 to 70. As an average of about 500 stumps a day can be bored, from 10 to 20 acres can be covered in one day, the maximum number of borings being possible where the stumps are thickest.

The cost of clearing land with this outfit and the use of nitroglycerin powder will range from \$5 to \$18 per acre, provided the wood from the stumps and roots can be sold for enough to pay for their disposal.

